Journal of Machine Learning

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Bridging Traditional and Machine Learning-based Algorithms for Solving PDEs: The Random Feature Method

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Summary for general readers:

Solving partial differential equations is of primary interest in computational sciences and engineering. There exists a long list of numerical methods, including classical methods such as finite difference and finite elements, and machine learning-based methods. When solving low dimensional problems, it remains unclear whether machine learning-based methods have a real advantage over traditional algorithms. The current work develops a random feature method that seems to share the merits of both traditional and machine learning-based methods. It competes well with traditional methods in terms of both accuracy and efficiency. At the same time, it inherits the flexibility of a machine learning-based method in the sense that is mesh-free and is particularly suited for problems with complex geometry.

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